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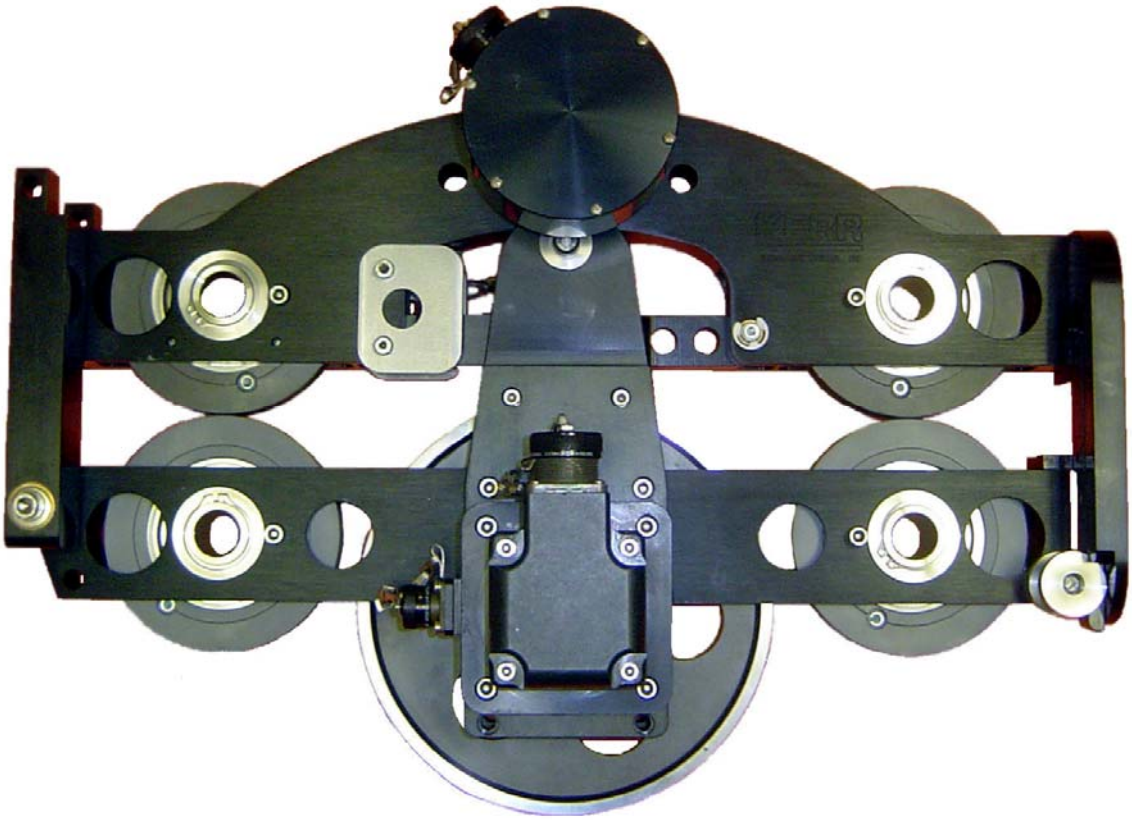
AM3KA539
COMBINED DEPTH/TENSION MEASUREMENT DEVICE
WITH LOW VOLTAGE TENSION AMPLIFIER



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1.0 GENERAL DESCRIPTION AND SPECIFICATIONS

The BenchMark Measurement System AM3K measuring device combines in one compact, lightweight unit, both depth measurement and line tension measurement capabilities. A single measuring wheel is used to drive an optical encoder. An electronic load axle is used to measure line tension.

1.1 DEPTH MEASUREMENT

The AM3K uses a single measuring wheel to measure the amount of wireline moving to and from the borehole. The measuring wheel is coupled to an encoder that transmits electrical signals via a cable to the hoistman's panel and/or logging computer representing cable travel. An independently powered encoder and display panel is used for back up depth indication.

The hardened measuring wheel has a 2.0000 ft. (609.600 mm) circumference with a 3/8" groove. A spring mounted tension roller is used to hold the measuring wheel in contact with the wireline.

Two guide rollers are used to properly hold the cable in line with the measuring wheel. Wear blocks are also used to guide the cable and prohibit cable contact with the frame members. The frame members are anodized 6061-T6 aluminum.

1.2 TENSION MEASUREMENT

The AM3K uses an electronic load axle on the measuring wheel to measure line tension. Three wheels are used to create a force on the load axle normal to the axis of the wireline. To generate this force the wheel mounted on the load axle is offset from the other two slightly. This offset creates a slight bend in the cable.

As wireline tension increases the small offset creates a corresponding bending force on the strain-gauged load axle. An electronic signal is transmitted via cable to the hoistman's panel and/or logging computer representing wireline tension. A calibrate resistor is included in the load pin to send out a signal to calibrate the computer system.

1.3 GENERAL SPECIFICATIONS

WEIGHT:	30 lbs	13.6kg
LENGTH:	19.6”	500 mm
HEIGHT:	13.5”	343 mm
WIDTH:	8.2”	208 mm
CABLE BEND OVER TENSION WHEEL:	< 10 Degrees	
MAXIMUM LINE TENSION:	10,000 lbs	4538 kg
MEASURING WHEEL CIRCUMFERENCE	24.000”	609.60 mm

MEASURING WHEEL CIRCUMFERENCE WITH CABLE INSTALLED

3/16” cable – 2.015 ft

7/32" cable - 2.017 ft.

1/4” cable – 2.020 ft.

9/32" cable – 2023 ft.

5/16" cable - 2.026 ft.

3/8" cable – 2.031 ft.

1.4 TENSION SPECIFICATIONS

Power Requirements:	9 – 15 vdc excitation	
Interface:	Strain Gauge bridge with 6 pin connector on load pin	
Temperature stability:	<= .015% full scale / deg F on zero	
	<= .02% full scale / deg F on output	
Accuracy:	Within 150 lbs or 3% of actual, whichever is greater	
Maximum load:	10,000 lbs	4536 kg

Signal Output (w 5/16” cable)

72mv @12v excitation = 10,000 lbs

Shunt cal = 36 mv @ 12v excitation = 5000 lbs

Multipliers for different sizes of cable

3/16” cable – 1.45

7/32" cable – 1.38

1/4” cable – 1.22

9/32" cable – 1.08

5/16" cable – 1.00

3/8" cable – .85

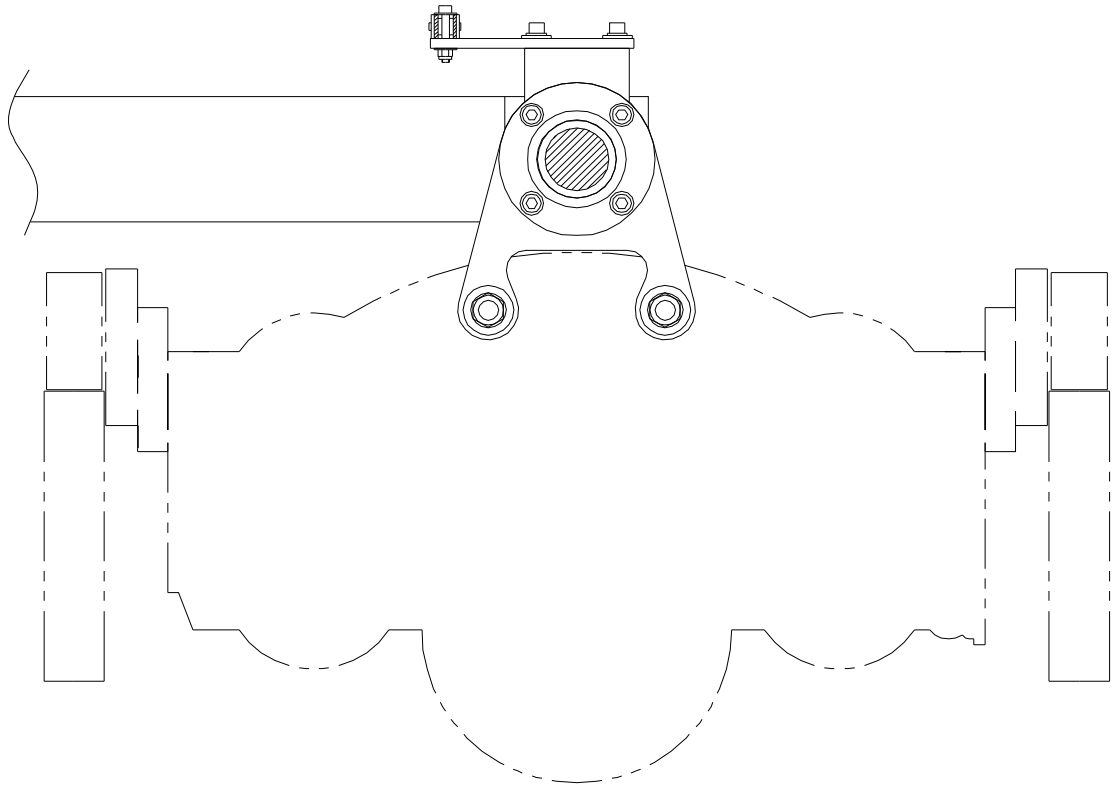
2.0 INSTALLATION AND OPERATING PROCEDURES

2.1 SPOOLING ARM INSTALLATION

Install the measuring head on to the spooling arm by using either the top adapter mount assembly to mount to an overhead spooling arm or the lower yoke floor mount assembly to mount to a floor mounted pedestal.

Following are some of the mount options:

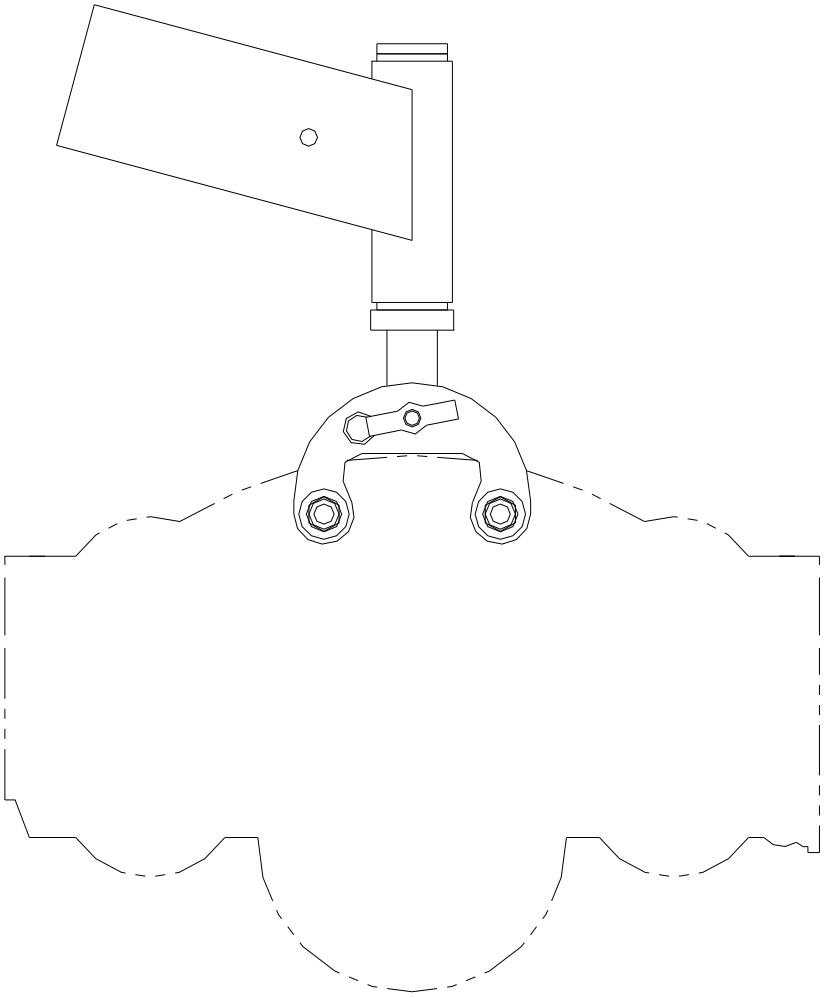
2.1.1 AM3KA243 OVERHEAD MOUNT FOR 40MM SINGLE BAR (ASEP SPOOLER)



AM3KA243 PARTS LIST

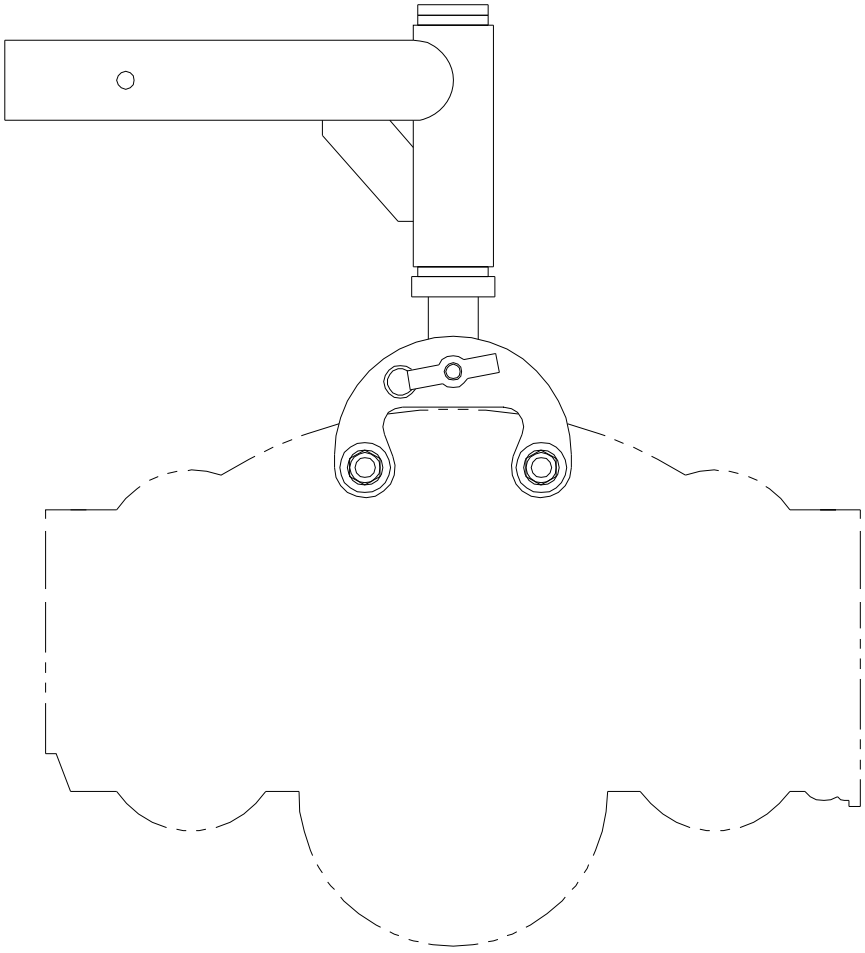
ITEM	PART NUMBER	DESCRIPTION	QTY
1	AM3KM124	HOUSING BRG FLANGE 40MM ASEP	2
2	AM3KM138	HUB GUIDE ASEP OH ARM	1
3	AM3KM139	HUB GUIDE INNER ASEP OH ARM	2
4	AM3KM140	SPACER GUIDE ASEP OH ARM	1
5	AM3KM155	PLATE SIDE PIVOT ASEP OH ARM	2
6	AM3KM141	PLATE CHAIN GUIDE ASEP OH ARM	1
7	AM3KM143	ADAPTER AUTO SPOOL ASEP OH ARM	2
10	AM3KM144	BEARING FLANGE 2 IN ID MOD	2
12	AMSLP088	BEARING LINEAR 40MMID X 50MMOD	2
15	AM3KP044	SCREW 1/2-13 X 3.25 SOC HD SST	2
16	AM5KP042	SCREW 1/2-13 X 3/4 SOC HD SST	6
17	AM5KP080	SCREW 3/8-16 X 3/4 SOC HD SST	4
18	AMS1P046	SCREW 5/16-18 X 1 SHCS SST	8
19	AM3KP057	SCREW 5/16-18 X 1-1/4 SOC HD	2
20	AMS1P049	SCREW 1/4-20 X 2-1/4 SOC HD SS	2
21	AM3KP058	SCREW 10-24 X 1-1/4 SHCS SST	3
23	AMS1P065	NUT 1/2"-13 SS	2
24	AM3KP059	NUT 10-24 ELASTIC STOP SST	3
25	C276P037	WASHER 1/2 FLAT SST	4
26	AMS1P047	WASHER 5/16 LOCK SS	8
27	AMS1P066	WASHER 1/2 LOCK SS	2
28	C276P036	WASHER 1/4 LOCK SS	2
29	ACMU2P31	WASHER 1/4 FLAT SS	2
30	AMS1P054	WASHER #10 FLAT SS	6

2.1.2 AM3KA241 OVERHEAD MOUNT USING 2X3 RECTANGULAR TUBING



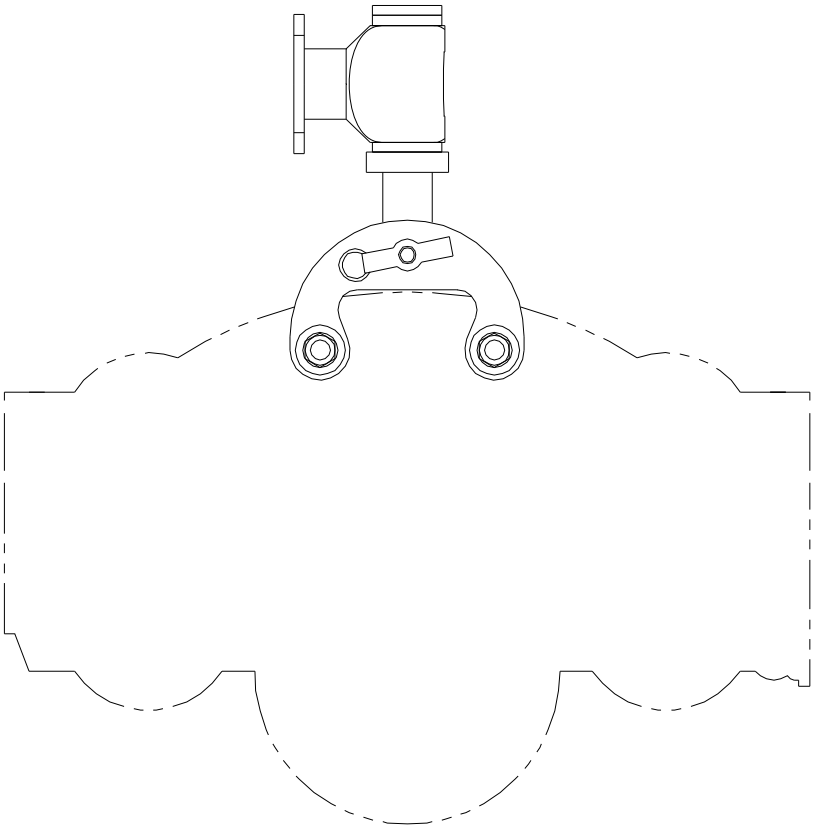
ITEM	PART NUMBER	DESCRIPTION	QTY
1	AM3KM055	PLATE SIDE PIVOT OH ARM 3 WHL	2
2	AM3KM019	PIVOT WELDMT SPOOL ARM RECT 2X3X15 DEG	1
3	AM3KM117	SHAFT PIVOT SPOOLING ARM 10 IN	1
4	AMS1P009	RETAINING PIN (T HANDLE)	1
6	AM3KP045	BEARING BRZ FLANGED	2
7	263437000	ONE-PIECE CLAMP-ON COLLAR	1
8	231194000	BEARING FLANGE 1.25ID x 1.25LG	2
9	AM3KM142	BUSHING FLANGE QUIK PIN OH ARM	2
10	AM3KP044	SCREW 1/2-13 X 3.25 SOC HD SST	3
11	C276P037	WASHER 1/2 FLAT SST	4
12	AMS1P066	WASHER 1/2 LOCK SS	3
13	AMS1P065	NUT 1/2"-13 SS	3
14	AM5KP075	CHAIN SASH #35 SST	12

2.1.3 AM3KA242 OVERHEAD MOUNT USING 2" ROUND TUBING

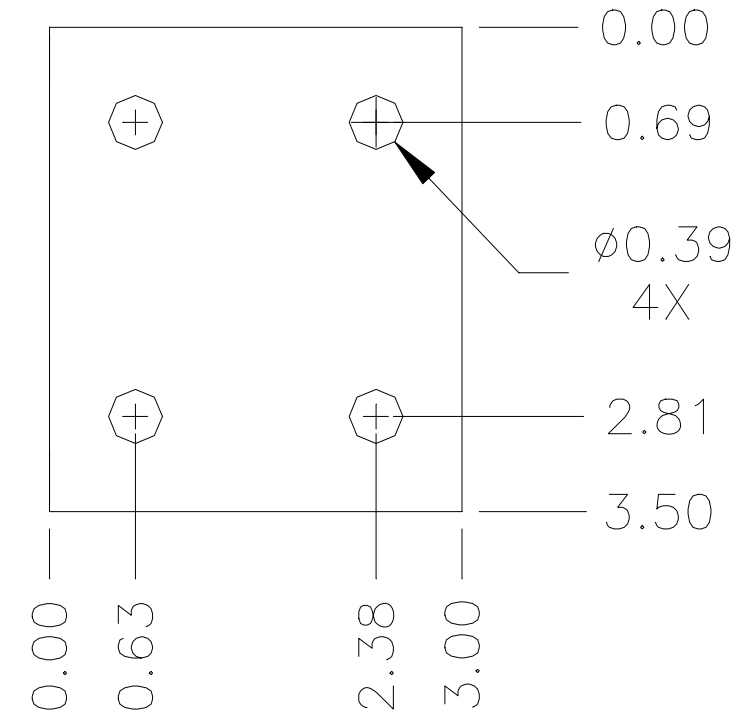


ITEM	PART NUMBER	DESCRIPTION	QTY
1	AM3KM055	PLATE SIDE PIVOT OH ARM 3 WHL	2
2	AMS8M019	PIVOT WELDMT SPOOLING ARM RD	1
3	AM3KM117	SHAFT PIVOT SPOOLING ARM 10 IN	1
4	AMS1P009	RETAINING PIN (T HANDLE)	1
6	AM3KP045	BEARING BRZ FLANGED	2
7	263437000	ONE-PIECE CLAMP-ON COLLAR	1
8	231194000	BEARING FLANGE 1.25ID x 1.25LG	2
9	AM3KM142	BUSHING FLANGE QUIK PIN OH ARM C MOUNT SST	2
10	AM3KP044	SCREW 1/2-13 X 3.25 SOC HD SST	3
11	C276P037	WASHER 1/2 FLAT SST	4
12	AMS1P066	WASHER 1/2 LOCK SS	3
13	AMS1P065	NUT 1/2"-13 SS	3
14	AM5KP075	CHAIN SASH #35 SST	12

2.1.4 AM3KA244 OVERHEAD FLANGE MOUNT

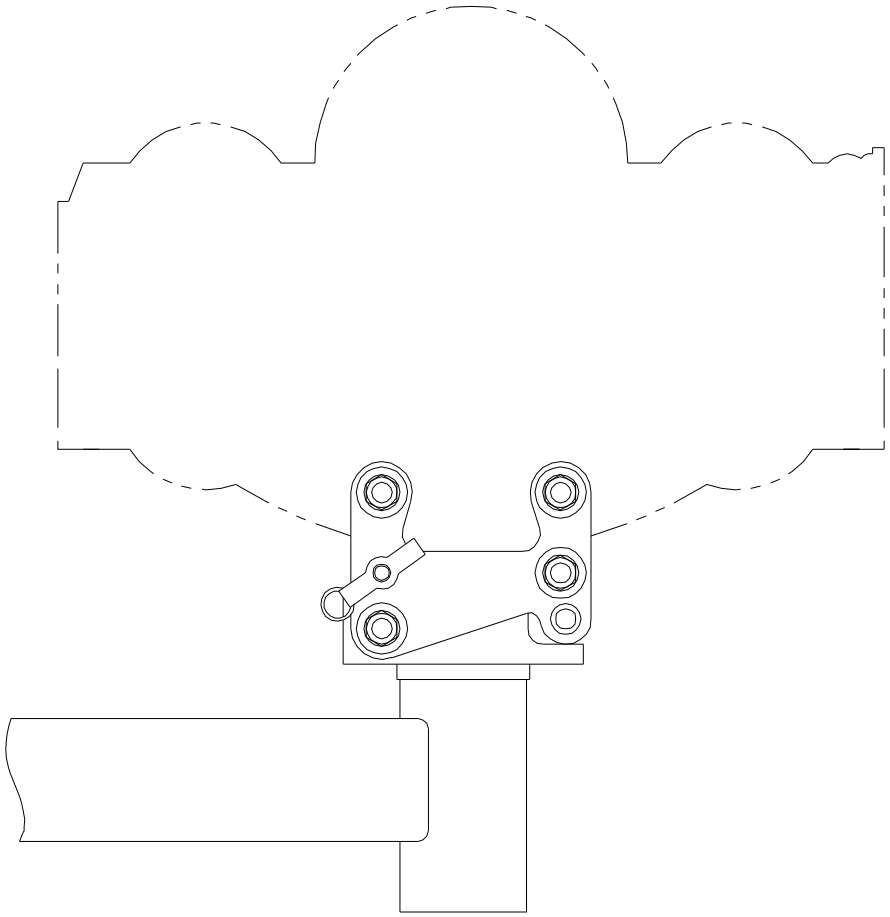


ITEM	PART NUMBER	DESCRIPTION	QTY
1	AM3KM055	PLATE SIDE PIVOT OH ARM 3 WHL	2
2	AM3KM238	YOKE PIVOT CENTER MOUNT SST	1
3	AM3KM217	SHAFT PIVOT SPOOLING ARM 7 IN	1
4	AMS1P009	RETAINING PIN (T HANDLE)	1
6	AM3KP045	BEARING BRZ FLANGED 1/2ID X	2
7	263437000	ONE-PIECE CLAMP-ON COLLAR ST S	1
8	231194000	BEARING FLANGE 1.25ID x 1.25LG	2
9	AM3KM142	BUSHING FLANGE QUIK PIN OH ARM	2
10	AM3KP044	SCREW 1/2-13 X 3.25 SOC HD SST	3
11	C276P037	WASHER 1/2 FLAT SST	4
12	AMS1P066	WASHER 1/2 LOCK SS	3
13	AMS1P065	NUT 1/2"-13 SS	3
14	AM5KP075	CHAIN SASH #35 SST	12



MOUNTING PLATE DETAIL

2.1.5 AM3KA240 BOTTOM PEDASTAL MOUNT



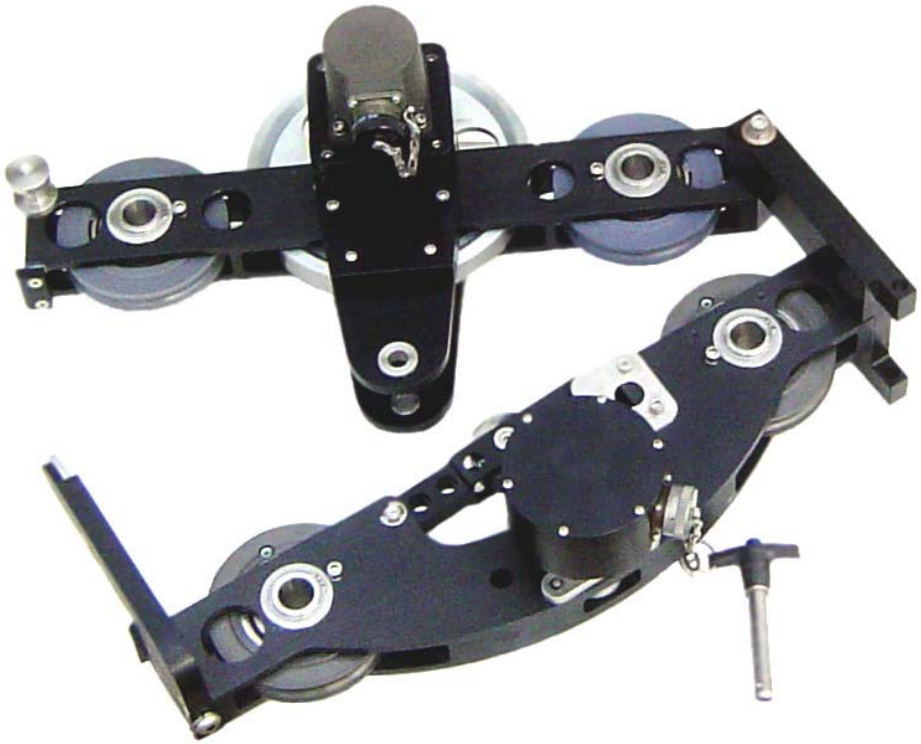
ITEM	PART NUMBER	DESCRIPTION	QTY
1	AM3KM130-1	PLATE SIDE PIVOT LEFT UNIV	1
2	AM3KM130-2	PLATE SIDE PIVOT RIGHT UNIV	1
3	AM3KM029	SPACER SST 3/4 SIDE MT 3 WHEEL	2
4	AM3KP044	SCREW 1/2-13 X 3.25 SOC HD SST	4
5	C276P037	WASHER 1/2 FLAT SST	8
6	AMS1P066	WASHER 1/2 LOCK SS	4
7	AM3KM118	BUSHING PLAIN QR PIN BTM MT SS	2
8	AMS1P009	RETAINING PIN (T HANDLE)	1
9	AM5KP075	CHAIN SASH #35 SST	6
10	AM5KP040	SCREW 10-24 X 3/8 SOC HD SST	1
11	C276P035	WASHER #10 LOCK SS	1
12	AMS1P065	NUT 1/2"-13 SS	4

2.2 CABLE INSTALLATION

To install cable, remove the push pin, and hinge the head open. Next insert the cable, swing the head closed and reinsert the pin. Refer to picture. If under load, the load will need to be removed from the pin prior to removal. A “C” clamp can be used to remove the load.

Make sure that the head can freely sit on the wireline. If the mounting arrangement will not let the head travel up and down freely and if the cable puts a upward or downward force on the measuring head, this force will cause an offset to the tension measurement which will result in an incorrect tension reading.

HEAD OPENED FOR CABLE INSTALLATION AND REMOVAL



2.3 SYSTEM OPERATION

2.3.1 Determine cable size to be used – 5/16” or 7/32”

Since the wireline cable actually bends around the measuring wheel, the circumference of the wheel is affected by the size of the cable. To accurately measure depth, this needs to be taken into account by increasing the size of the wheel. The bend radius of the wireline cable also affects the tension measurement.

These corrections are automatically made in the Kerr AMS4 Panels by selecting the proper cable size using the menu.

To enter wheel size corrections directly, use the following wheel circumferences:

3/16” cable – 2.015 ft.

7/32" cable - 2.017 ft.

1/4” cable – 2.020 ft.

9/32" cable – 2023 ft.

5/16" cable - 2.026 ft.

3/8" cable – 2.031 ft.

2.3.2 Install line in measuring head (refer to section 2.2).

2.3.3 Make sure line is laying slack and head is free to move and hanging level. Press the Ten Zero Cal button and tension value should read 0.

2.3.4 Press the Ten Cal button and tension should read 5000 lbs with 5/16" cable or 6200 lbs with 7/32" cable.

2.3.5 Press the Zero Depth button to set the depth to zero when the tool is hanging at the zero point.

2.3.6 At this point, the system is ready to log.

3.0 MAINTENANCE AND REPAIR PROCEDURES

3.1 PRE-JOB CHECK

Each time the system is used perform the following steps:

Verify that the AM3K is properly and securely attached to the spooling arm. Several different mounting kits are available for different types of spooling arms.

Verify that the depth measuring wheels are clean and that no groove has been worn into the measuring wheel surface. Check the measuring and guide wheels for looseness, play, out-of-roundness, worn or rough sounding bearings, or other mechanical conditions that could affect measurement accuracy. Ensure that the wheel bearings inner race is not spinning on the shaft and that the shaft is not spinning in the bushings.

Verify that all fasteners are tight and that the ball lock pushpin is secure. Verify that the encoder, electronic load pin, and backup counter cable are installed and properly routed. Verify that the depth system is working by turning the wheel and observing the hoistman's panel and backup display unit to indicate cable movement. The hoistman's panel and backup display should measure 2' for each rotation of the wheel.

3.2 POST-JOB MAINTENANCE

At the completion of each job, thoroughly clean and dry the device as soon as possible. This avoids problems caused from borehole residues transferred from the wireline onto the measuring device. Borehole residues should be washed from the device with a cleaning solvent such as Varsol or an equivalent type. Rinse the device with water, dry, and wipe down with an oily rag.

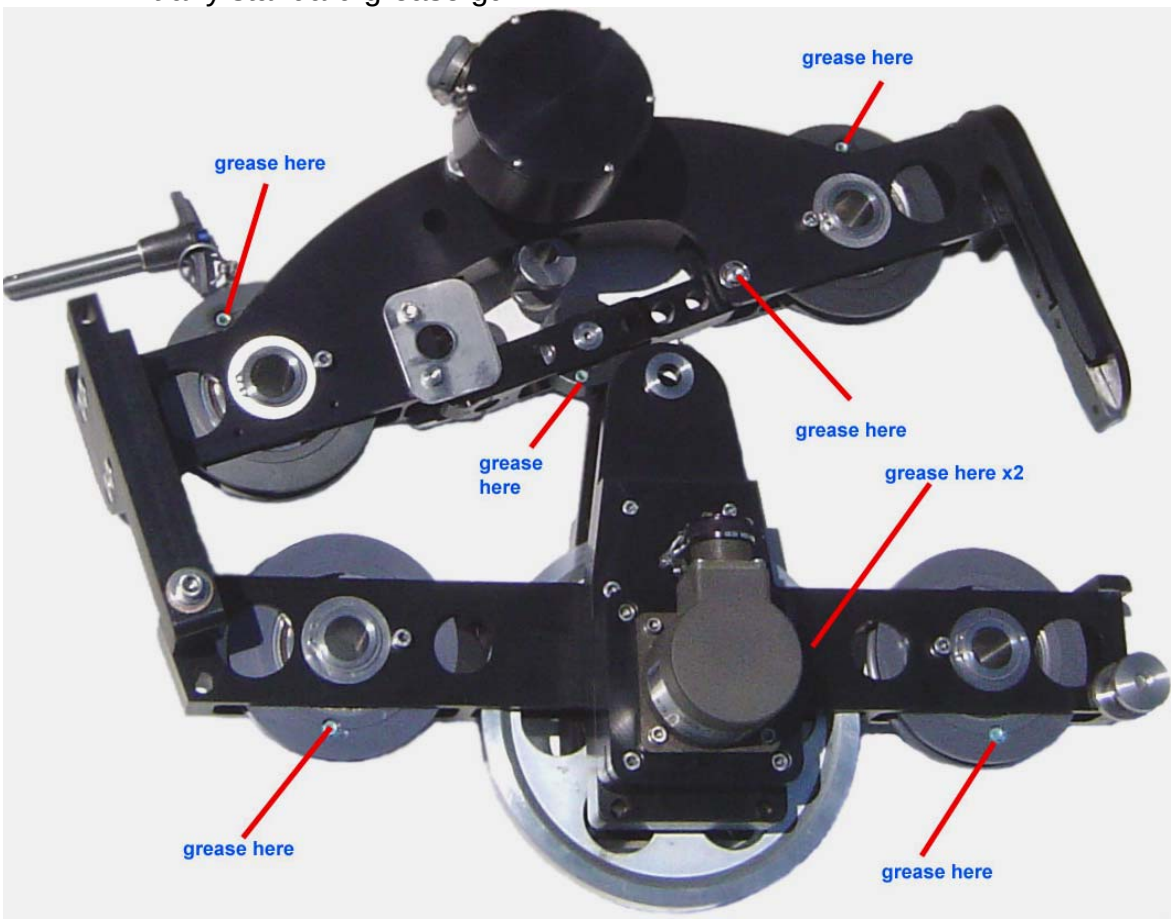
<u>Do not pressure wash</u>

3.3 MONTHLY MAINTENANCE

Visually inspect the interiors of the electrical connectors for the encoders and electronic load axle for dirt and evidence of insulation breakdown. Clean or replace as necessary. Install dust caps on the connectors if the cables are removed.

Manually rotate each wheel by hand to verify its condition. Inspect the depth measuring wheels for signs of abnormal wear, diameter changes, or shaft/bearing play that can affect measurement accuracy. The wheel should be replaced if it is grooved more than .005". The wheel should be 7.639 / 7.640" (194 mm) in diameter with a 24" circumference (609.6 mm). Inspect the two grooved guide wheels on either side of the tension wheel. They should be 4" (101.6 mm) in diameter (bottom of groove).

Grease all the wheels and bearings that are fitted with a grease fitting (see following diagram). Use a water proof, marine grade grease. An inverted grease nozzle (Kerr p/n AM5KP130) is supplied with each head. This nozzle will fit any standard grease gun.



3.4 ASSEMBLY / DISASSEMBLY PROCEDURES

3.4.1 MEASURING WHEEL, SHAFT, AND BEARING REMOVAL

Remove encoder adapter and cover on opposite side.
Remove both side plates.
Remove wheel and axle assembly.
Install new wheel and axle assembly with spacers.
Reinstall side plates and encoder adapter and cover.
It is recommended that the main bearings be replaced at this time.

3.4.2 ELECTRONIC LOAD PIN REMOVAL

The electronic load pin is held in place by one retaining ring on the outer end of its shaft. Remove the retaining ring. The load pin can then be removed from the mounting frame.

3.4.3 BACKUP DEPTH PICKUP REMOVAL AND INSTALLATION

The backup depth magnetic pickup is mounted to the encoder adapter. It is held in place by four screws. Remove the screws and the pickup can then be removed. The pickup must be properly oriented to work correctly. The slot should be oriented to the top. The top side is the encoder side. Ensure that an o-ring is inserted between the plastic housing and the mount. An additional o-ring is used between the connector and the housing to keep moisture out.

If the backup display is counting backward (i.e. counting negative when going downhole), simply rotate the pickup 180 degrees to change the direction.

3.4.4 ENCODER COUPLING INSTALLATION

To install the encoder coupling, first remove the plug in the encoder adapter. Install one of the metal parts of the three piece coupling to the wheel shaft and tighten it using a hex wrench. Next, install the center plastic piece on the wheel shaft coupling. Place the other metal coupling on the encoder shaft and set the encoder on the mount. Snug up the encoder coupling then remove the encoder and tighten the coupling.

Reinstall the encoder with o-rings and tighten it to the encoder mount. Next tighten the plug.

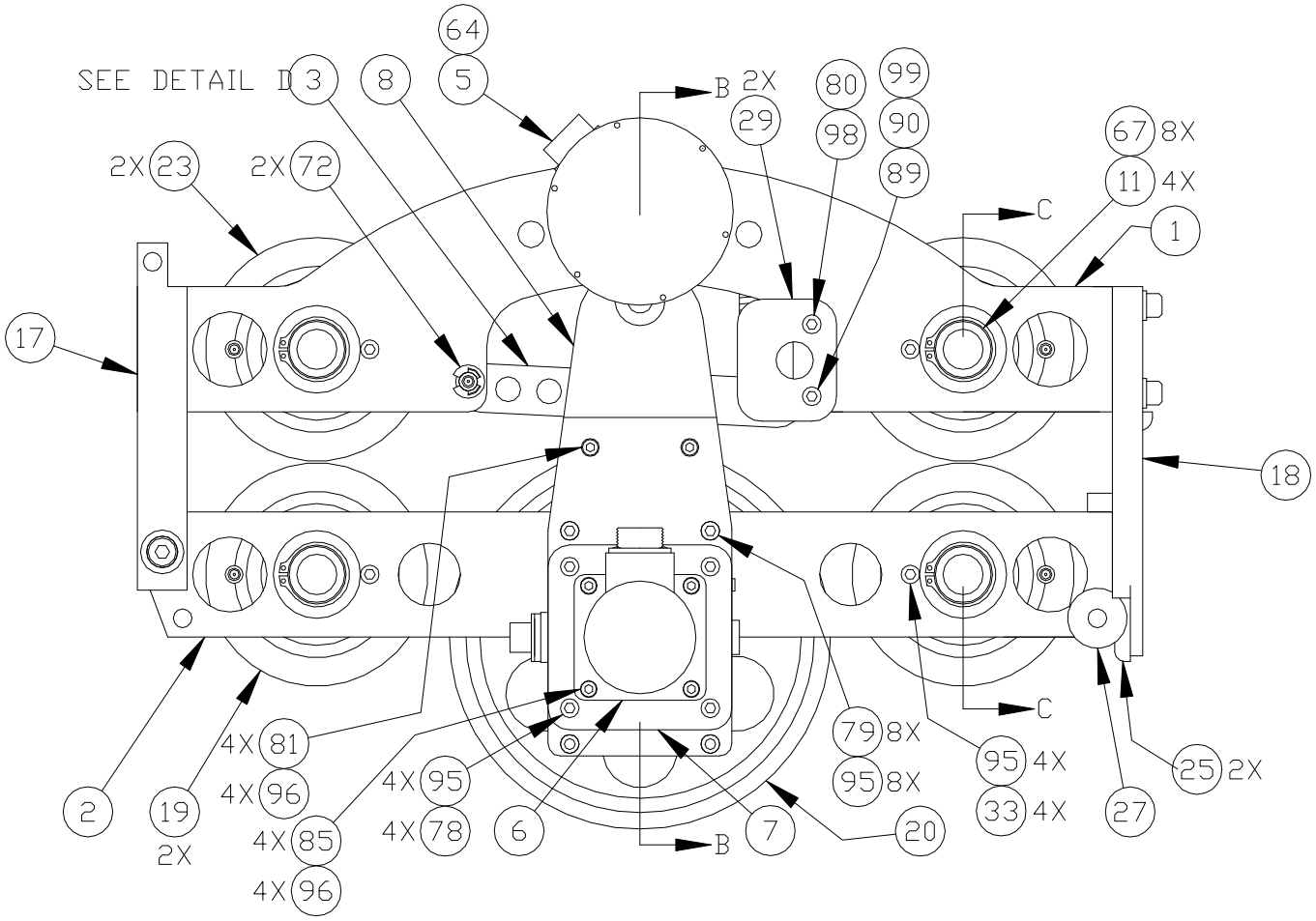
4.0 RECOMMEND SPARE PARTS LIST

QTY	P/N	DESCRIPTION
1	AM5KA137	ASSY WHEEL GUIDE 4 INCH COMPOSITE WITH BEARING
1	AM5KA164	ASSY WHEEL TENSION FIXED 35MM WITH BEARING
1	AM5KM157	BEARING BALL FAFNIR 207PP GREASEABLE (for AM5KA137 and AM5KA164 tension wheels)
1	AM3KA187	ROLLER ASSY PRESSURE 3/8" GROOVE WITH BEARING
1	AM3KM002	BEARING BALL FAFNIR 200PP GREASEABLE MOD (for AM3KA187 pressure roller)
1	AM3KA110	ASSY WHEEL MEASURING 2FT 3/8" GROOVE (includes shaft)
2	AMS1P003	BEARING BALL 204PP GREASABLE MOD (for measuring wheel)
1	AM3KM050	ENCODER COUPLING ASSY WITH MAGNETS
1	AM3KP203	LOAD PIN ASSY LOW VOLTAGE
1	AM5KA079	ENCODER 1200 PPR EX
1	AM5KA055	MAGNETIC PICKUP ASSY
1	AMS1P009	RETAINING PIN (T HANDLE)
1	AM5KP130	GREASE NOZZLE

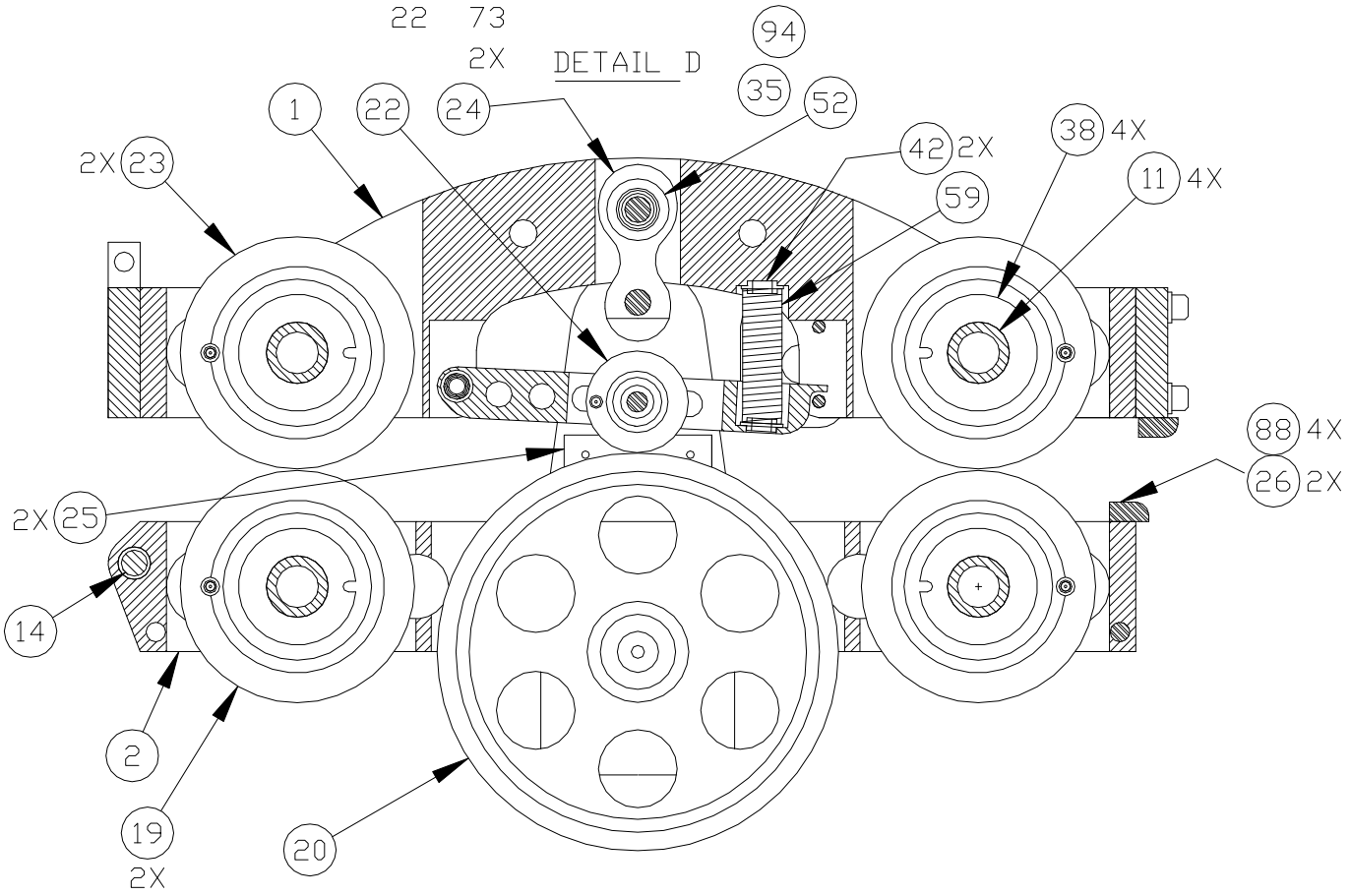
5.0 DRAWINGS AND PARTS LISTS

5.1 MEASURING HEAD DRAWINGS

SIDE VIEW

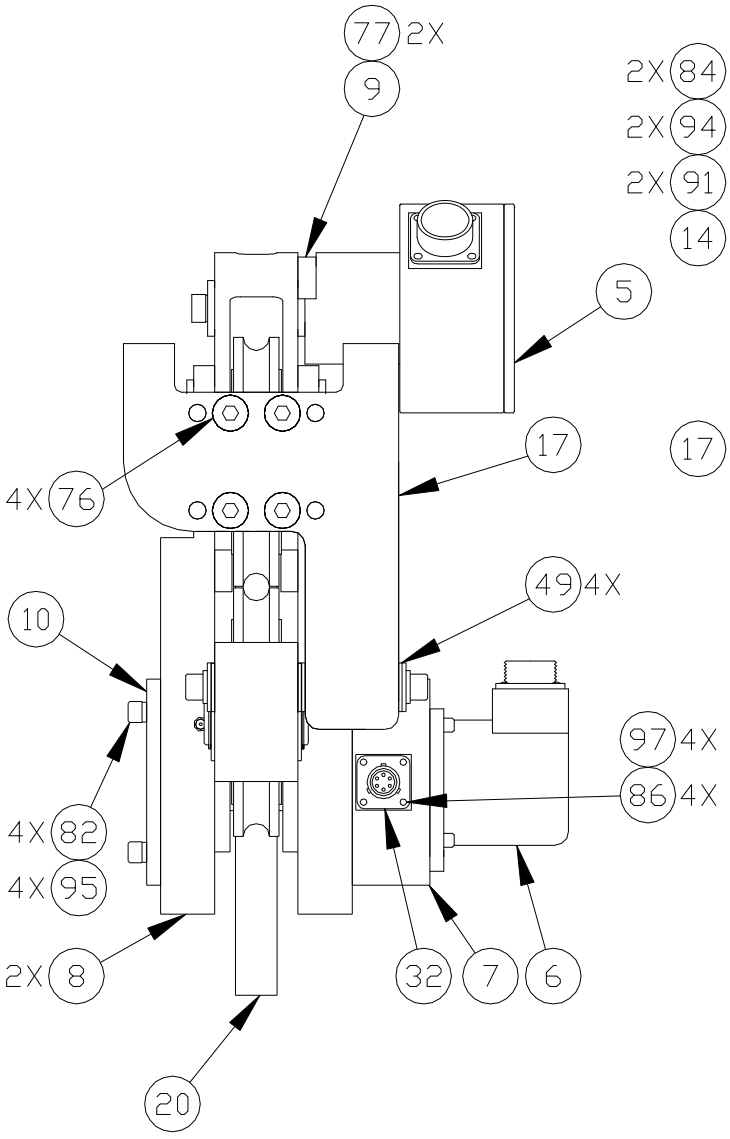


SIDE CUTAWAY VIEW



VIEW A-A

DRUM END VIEW



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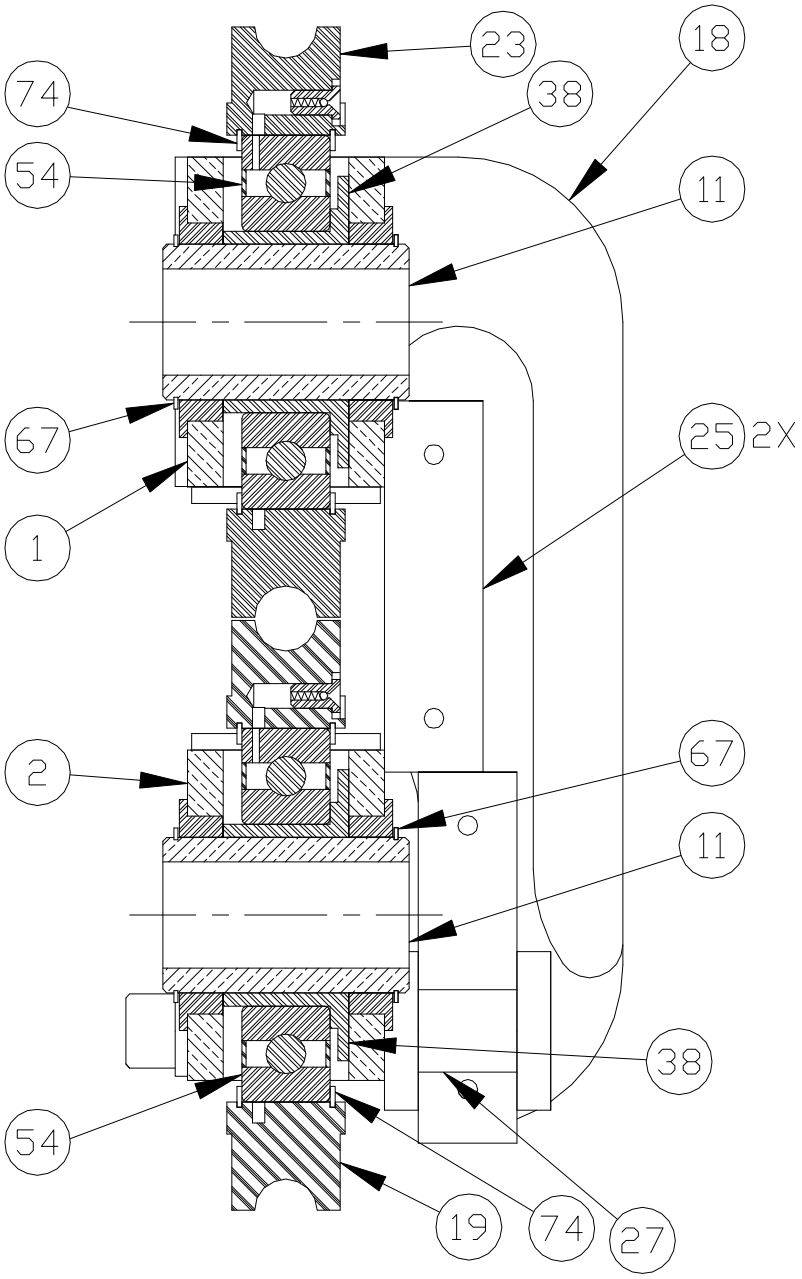
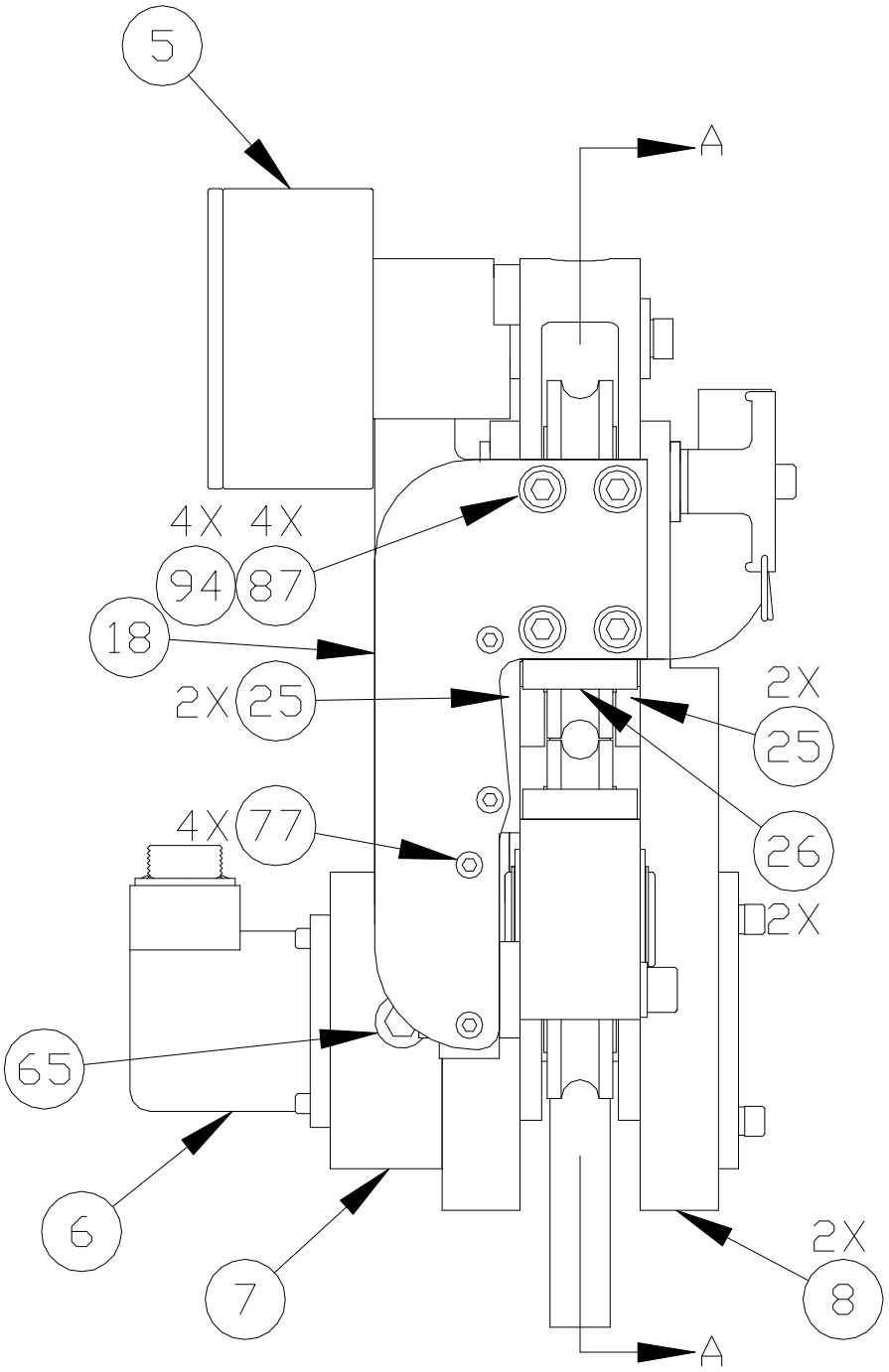
DRUM END CUTAWAY VIEW

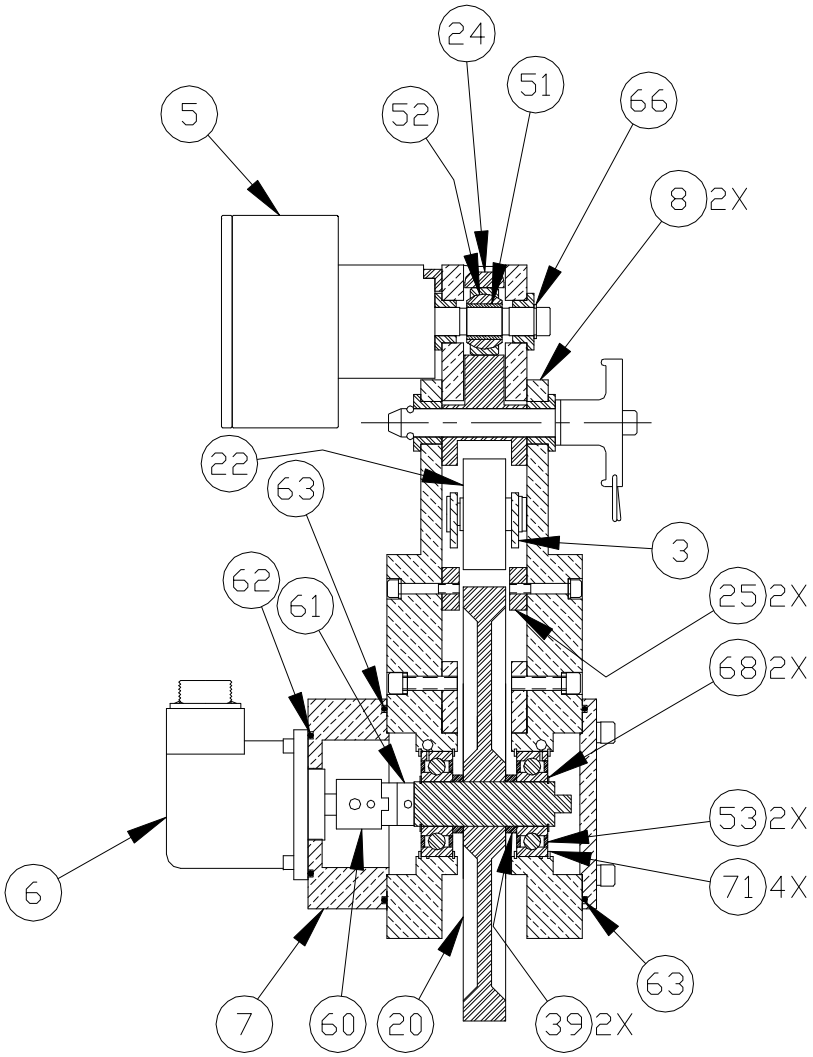


VIEW C-C

WELL END VIEW

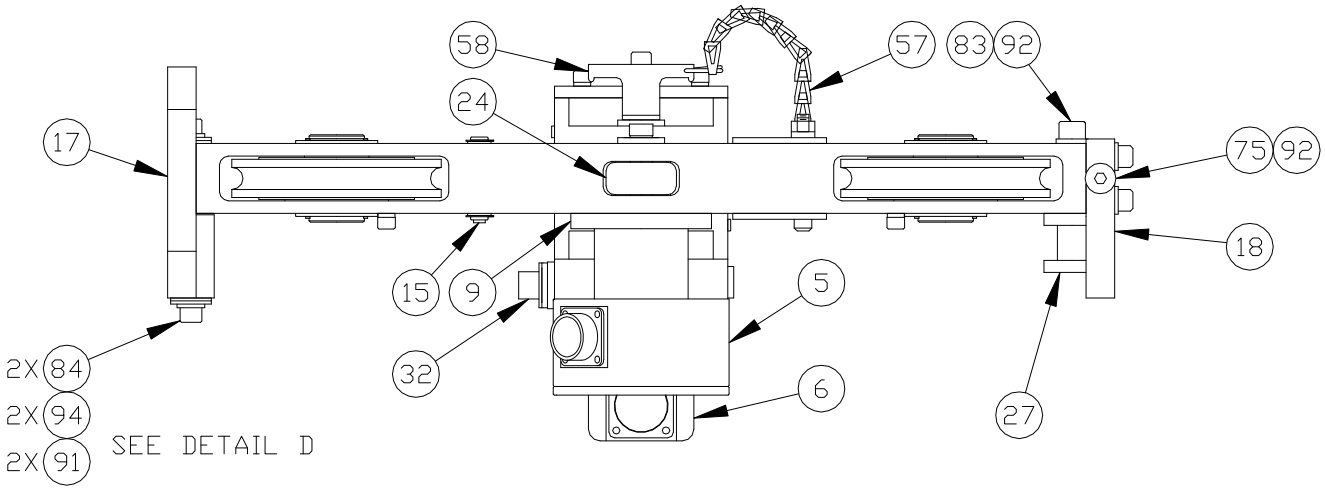


WELL END CUTAWAY VIEW

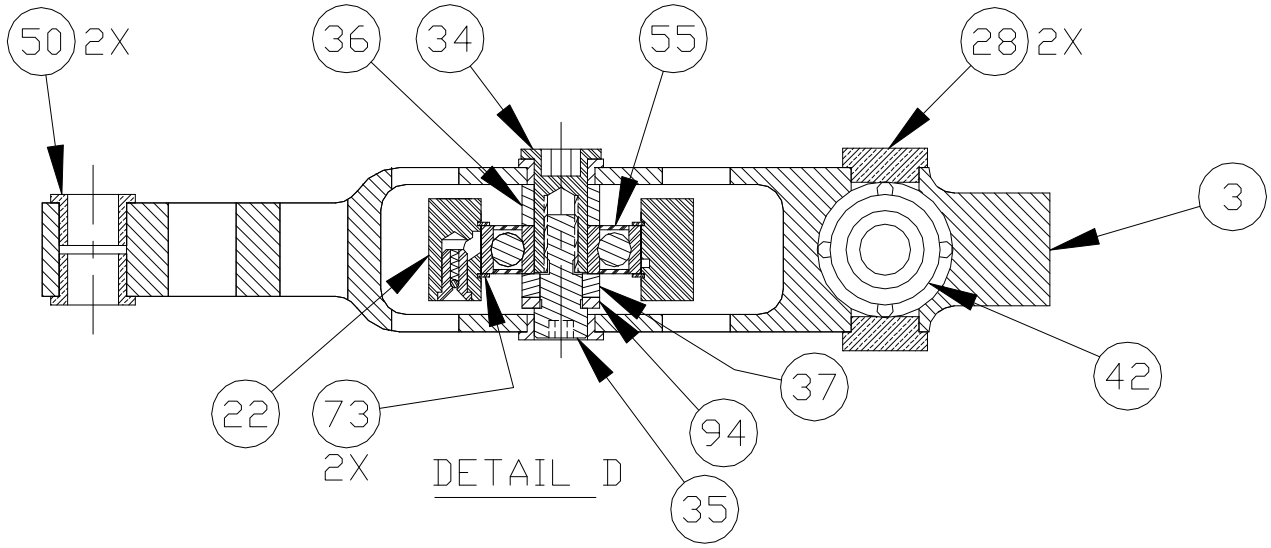


VIEW B-B

TOP VIEW



TOP CUTAWAY VIEW



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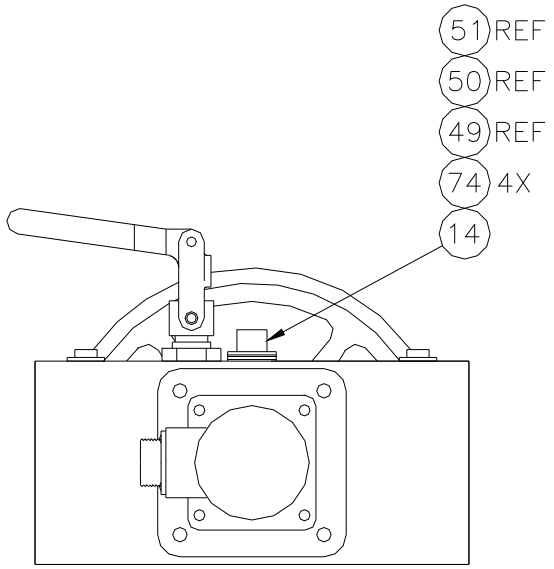
MEASURING HEAD PARTS LIST

ITEM	PN	DESCRIPTION	QTY	REF
1	AM3KA131	FRAME ASSY UPPER	1	
2	AM3KA132	FRAME ASSY LOWER	1	
3	AM3KA148	ASSY PIVOT PRESS WHEEL W/GIDE	1	
4	AM3KA240	KIT MOUNTING AM3K FLOOR	0	OPTION
4	AM3KA241	KIT MOUNTING AM3K OVERHEAD ARM 2X3 RECT	0	OPTION
4	AM3KA242	KIT MOUNTING AM3K OVERHEAD ARM 2IN ROUND	0	OPTION
5	AM3KP203	ASSY LOAD AXLE LOW VOLTAGE	1	
6	AM5KA079	ENCODER 1200 PPR EX	1	
7	AM3KM040	ADAPTER ENCODER H25D/H20 MAG BACKUP	1	
7	AM5KM057	ADAPTER ENCODER H37C/H25D	0	OPTION
8	AM3KA121	PLATE SIDE ASSY W/PRESSURE WHL	2	
9	AM3KM135	PLATE ORIENTATION LOAD PIN	1	
10	AM5KM058	COVER ENCODER ADAPTER	1	
11	AM5KM011	SHAFT TENSION ROLLER 30MM SST	4	
14	AM5KM023	SHAFT PIVOT HORIZONTAL 1/2 SST	1	
15	AM3KM023	SHAFT PIVOT PRESS ROLR 3/8 SST	1	
17	AM3KA125	MOUNT ASSY PIVOT W/TIEDOWN 3K	1	
18	AM3KM156	GUIDE REAR 3 WHEEL	1	
19	AM5KA137	ASSY WHEEL GUIDE PLAS 35MM BRG	2	
20	AM3KA001	ASSY WHEEL MEASURING 2' 3/8" GROOVE	1	
22	AM3KA187	ROLLER ASSY PRESSURE 3/8" GROOVE	1	
23	AM5KA164	ASSY WHEEL TENSN FIXD 35MM BRG	2	
24	AM3KA236	LINK ASSY LOAD PIN W/SPHER BRG	1	
25	AM3KM234	BLOCK WEAR 0.75 X 2.50 TOOLSTL W/10-24 HOLES	2	
26	AM3KM064	PLATE WEAR 3/8 X 3/4 X 1-1/2	2	
27	AM3KM154	SPOOL GUIDE REAR 3 WHEEL	1	
28	AM3KM153	BUTTON GUIDE PRESS WHL PIVOT	0	REF
29	AM3KM152	PLATE GUIDE PRESS WHL PIVOT	2	
30	AM3KM115	BLOCK WEAR	2	
32	AM5KA055	ASSY ENCODER BACKUP MAGNETIC	0	OPTION
33	AM5KM084	SCREW ANTI-ROTATION TENS WHEEL	4	
34	AM3KM052	BOLT SHOULDER 10MM OD SST 1/4-20 INT THD	1	
35	AM3KM053	BOLT SHOULDER 5/16 X 1/4 MOD	1	
36	AM3KM043	SPACER 10MMID X 0.57OD X 0.30W SST	1	
37	AM3KM044	SPACER .31ID X 0.57OD X 0.175W SST	1	
38	AM5KM155	BUSHING 35MM BRG W/ANTI-ROTATN	0	REF
39	AM5KM039	SPACER 20MMID X 1.00OD X .197W PLASTIC	2	
42	AM3KM049	GUIDE SPRING PRESS WHEEL 3 WHL	2	
49	AM5KP019	BEARING BRZ FLANGED 1/2" ID OIL IMPRG	0	
50	AM3KP009	BEARING BRZ FLANGED 3/8" ID OIL IMPRG	0	
51	AM3KP032	BEARING BRZ .50ID X .625OD X .62 LONG	0	LOAD PIN LINK BRG
52	AM3KP039	BEARING SPHERICAL 5/8" ID SELF LUBE SST	0	LOAD PIN LINK

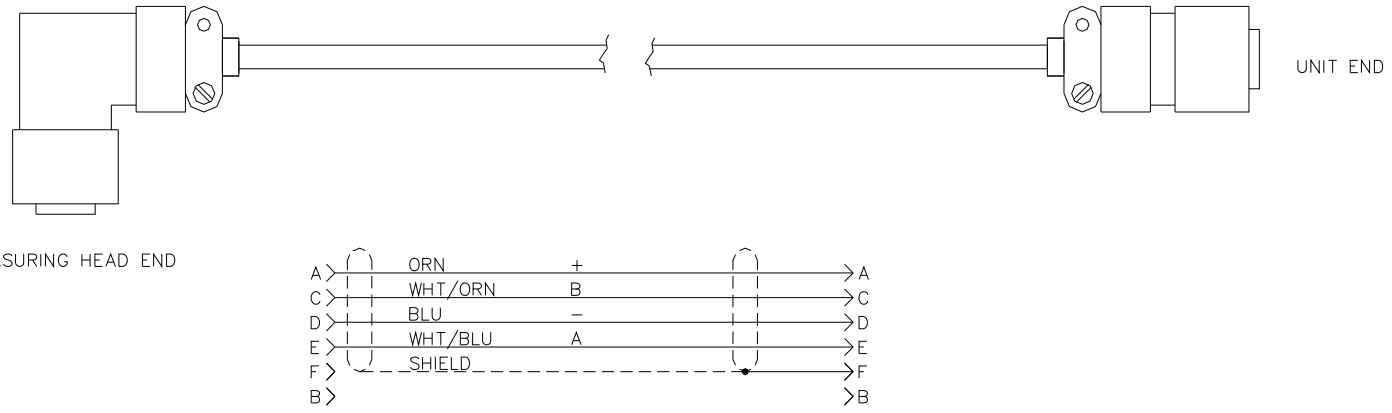
53	AMS1P003	BEARING BALL 20MM ID MOD W/HOLE	2	
54	AM5KM157	BEARING BALL 35MM ID MOD GREASE HOLE	0	REF
55	AM3KM002	BEARING BALL 10MM ID MOD GREASE HOLE	0	REF
57	AM5KP075	CHAIN SASH #35 SST	6	
58	AMS1P009	RETAINING PIN (T HANDLE)	1	
59	AM3KP014	SPRING COMP 3-1/8 OAL 3/4 DIA SST	1	
60	AM3KM050	COUPLING ENCDR W/BKUP MAGNETS	0	OPTION
61	AMS1P090	COUPLING OLDHAM ENCODER	1	
62	AM5KP071	O-RING 2-141 BUNA N H25 ENCDR	1	
63	AMS1P014	O-RING 2-152 BUNA N ENC ADPTR	2	
64	AM5KP067	DUST CAP CWL	0	
65	AMS1P072	PLUG 3/8 NPT SS	1	
66	AM5KP033	RING RETNG EXT 0.500 SHAFT SST	1	
67	AM3KP018	RING RETNG EXT 1.188 SHAFT SST	8	
68	AM3KP017	RING RETNG EXT 0.781 SHAFT SST	2	
71	AMS1P006	RING RETNG INT UR187S	4	
72	AM3KP048	RING RETNG EXT 0.375 E-RING SST	2	
73	AM3KP015	RING RETNG INT UR-118S SST	0	
74	AM5KP168	RING RETNG INT 2.875 LT DUTY .039 THICK SST	0	REF
75	AM5KP043	SCREW 3/8-16 X 1/2 BUTTON HD SST	1	
76	AM5KP038	SCREW 5/16-18 X 7/8 FH SOC SS	4	
77	AM5KP045	SCREW 10-24 X 1/2 FH SOC SST	6	
78	C276P031	SCREW 1/4-20 X 1-1/4 SOC HD SS	4	
79	AMSLP025	SCREW 1/4-20 X 1 SOC HD SST	8	
80	AMS1P049	SCREW 1/4-20 X 2-1/4 SOC HD SS	1	
81	AM3KP054	SCREW 10-24 X 1 SHCS SST	4	
82	AMS1P048	SCREW 1/4-20 X 3/4 SOC HD SST	4	
83	AMSLP060	SCREW 3/8-16 X 2-3/4 SOC HD SS	1	
84	AM3KP028	SCREW 5/16-18 X 1/2 SHCS SST	2	
85	AMS1P053	SCREW 10-24 X 2 SOC HD SST	4	
86	C276P331	SCREW 6-32 X 1/2 PHIL PAN SST	4	
87	AMS1P046	SCREW 5/16-18 X 1 SHCS SST	4	
88	AM3KP070	SCREW 10-24 X 5/8 FH SOC SST	4	
90	AMS1P054	WASHER #10 FLAT SS	1	
91	C276P039	WASHER 5/16 FLAT SST	2	
92	C276P513	WASHER 3/8 FLAT SST	2	
94	AMS1P047	WASHER 5/16 LOCK SS	7	
95	AM5KP144	WASHER 1/4 LOCK SS HIGH COLLAR	0	
96	C276P035	WASHER #10 LOCK SS	8	
97	C276P046	WASHER #6 LOCK SS	4	
98	AM5KP048	NUT 1/4"-20 ELASTIC STOP SS	1	
99	AM3KP059	NUT 10-24 ELASTIC STOP SST	1	
100	AM5KP130	NOZZLE GREASE FITTNG FLUSH	1	

5.2 BACKUP ODOMETER CABLE AND WIRING



14	AM5KA058	ASSY ENCODER BACKUP MAGNETIC	1	EA
49	AM5KP027	CONN KPT02E10-6P RECEPTACLE MS3112	1	EA
50	AM5KP034	DUST CAP KPT8110C CANNON SHELL SIZE 10	1	EA
51	C276P041	O-RING 2-017	2	EA
74	AMS1P040	SCREW 6-32 X 3/8 PAN HD SST	4	EA

AM5KA024-20 BACKUP ODOMETER CABLE



1	AMS7P062	CABLE 24/2P STNDED TC PE/PVC AL/MY SHLD W/DW NEC CMUL2919	20	FT
2	AM5KP057	CONN KPT06F10-6P STR PLUG	1	EA
3	AM5KP058	CONN KPT08F10-6S RT ANGLE PLUG	1	EA
4	AM5KP059	DUST CAP KPT8010C CANNON	2	EA
5	AM5KA034	BUSHING #9779-513-4 AMPHENOL	2	EA